A 30-Meter Walking Test as a Measure of Cervical Spondylotic Myelopathy Severity: Test Characteristics and Results from Two Multicenter Cohort Studies

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Introduction

- Cervical spondylotic myelopathy (CSM) is a progressive degenerative condition that causes spinal cord compression.
- Symptoms: hand tingling/numbness, difficulty walking, neck pain, impotence.
- With increasing aging population, frequency of CSM will continue to increase.
- Surgery commonly recommended.
Introduction

- 30-meter Walking Test (30MWT): simply measure time taken to walk 30 meters
- Longer time = greater disability
- Original study: small sample size; test results only compared to MDI and Nurick Scales
- Goal: evaluate reproducibility, validity, and responsiveness of 30MWT by conducting retrospective cohort analysis using data from two recent prospective multicenter CSM cohort studies: AOSpine NA (278 patients), AOSpine International (479 patients)
Standard Measurement Methods

- Modified Japanese Orthopaedic Association Scale (mJOA)
- Nurick Scale
- Visual Analog Scale (VAS)
- Short-Form 36 (SF-36v2)
- Neck Disability Index (NDI)
- Myelopathy Disability Index (MDI)

- Insensitivity, lack of objectivity, difficulty of administration
Methods

- Age ≥18; symptomatic CSM; cord compression on MRI; no prior surgical treatment for myelopathy; no symptomatic lumbar stenosis
- Measurements at baseline, 6, 12, and 24 months: mJOA, Nurick, NDI, SF-36v2
- Walk 30 meters quickly as comfortable, with assistive devices if needed
- 30MWT attempted x3 at each visit
Methods

- 70 patients unable to walk included in analysis through imputation
- Repeated measures analysis of variance (ANOVA); Pearson’s R coefficient correlation; Paired T tests; effect size; standardized response mean
- Multicenter; large sample size; few inclusion criteria; many different investigators; external validity
Results: Baseline vs Post-Op

- In the two trials, 589 patients completed 30MWT x3 at baseline
- ANOVA failed to show statistically significant difference between the trials (p=0.641)
- 558 patients had data at baseline and 6 months
- Mean reduction in walking time at 6 months: 8.32 seconds (p<0.0001); remained statistically significant in sensitivity analysis
Results: Correlation

30MWT compared with Nurick, mJOA, NDI, SF-36v2 PCS, and SF-36v2 MCS

All correlations statistically significant at $p<.0001$
Results: Responsiveness

- Both effect size and standardized response mean range from 0 to 1, with 1 representing perfect test responsiveness

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>SRM</th>
<th>ES</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>558</td>
<td>0.245</td>
<td>0.207</td>
</tr>
<tr>
<td>Top 50% of cohort acc. to walking time (30MWT&gt;28.5 seconds)</td>
<td>259</td>
<td>0.414</td>
<td>0.405</td>
</tr>
<tr>
<td>Top 25% of cohort acc. to walking time (30MWT&gt;37 seconds)</td>
<td>128</td>
<td>0.677</td>
<td>0.87</td>
</tr>
</tbody>
</table>
Conclusions

- The 30MWT is simple, quick, and affordable
- Shows high test-retest reliability and good divergent and convergent validity
- Shows moderate correlation with other widely used measures of CSM severity
- Responsive to change in patients with more severe CSM
- The 30MWT is a useful ancillary test for evaluating gait parameters in patients with CSM